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A REVISION OF THE GENUS *BOCOA*
(CAESALPINIOIDEAE-SWARTZIEAE)

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INTRODUCTION

Aublet (1775) described the genus *Bocoa*, with a single species, *B. prouacensis*, in a supplemental section of his classic work on the plants of French Guiana. When Schreber (1789-1791) and Willdenow (1800) considered the species of what now is *Swartzia*, no mention was made of *Bocoa*, and, except for the confusion with *Inocarpus* and *Etaballia* discussed below, the genus was ignored thereafter. In fact, taxa congeneric with *B. prouacensis* were described subsequently as species of *Swartzia* by Bentham (1840) and others. Tulasne (1843) even redescribed the genus under a new name, *Trischidium*, based on a species published by Bentham three years earlier. It remained for Amshoff (1939) to recognize the affinities of *Bocoa*, although she considered it a synonym of *Swartzia*. My earlier study of this subtribe convinced me of the distinctness of the two genera and in my monograph of the species of *Swartzia* (Cowan, 1968), I excluded several as taxa belonging to *Bocoa*; the new combinations were not made, pending further study of specific characteristics.

If one consults *Index Kewensis*, *Bocoa* will be found listed as a synonym of *Inocarpus* Forster, an Old World genus of which one species is widely cultivated on islands of the Pacific Basin. Another synonym that appears under this genus is *Etaballia* Bentham. Although the three genera were maintained by Bentham as separate taxa in the beginning, he was less than convinced in his 1862 paper on the subject and later in the *Genera Plantarum* he synonymized his genus under

Inocarpus. Comparison of herbarium material of the species of *Etaballia* and *Inocarpus* does raise considerable doubt concerning their separateness and, in fact, they have been considered to be congeneric by some later workers. Most recently, Rudd (1970) concluded they should be treated as separate genera, pending further detailed studies.

Whether or not two genera are involved, the species of *Etaballia* and *Inocarpus* are clearly papilionate legumes and have little similarity to the caesalpinoid genus *Bocoa*, except for the unifoliolate leaves of many of the taxa in question. The flowers of *B. prouacensis*, the only species Bentham accepted in the genus, are quite distinctive in being apetalous, other species of the genus having a single obovate petal; in contrast, flowers of *Inocarpus* and *Etaballia* have five, strap-like petals and a very different androecium. The latter genera have indehiscent fruits while those of *Bocoa* are dehiscent in two valves along both sutures.

The characteristics separating *Bocoa* and *Swartzia* can be set out clearly in a key:

- | | |
|---|-----------------------|
| Anthers oval or oblate to oblong, dorsifixed; stamens usually many and dimorphic, the filaments several times the length of the anthers; seeds arillate; herbage not foetid; leaflets rarely alternate | <i>Swartzia</i> |
| Anthers linear to narrowly oblong, basifixed; stamens 7-30, the filaments and anthers of similar length; seeds usually exarillate; herbage often foetid in fresh state; leaflets often alternate to subopposite | <i>Bocoa</i> |

There is greater similarity morphologically between these genera than there is between *Swartzia* and other genera of this compl. One is tempted to think of *Bocoa* as a phylogenetic derivative of *Swartzia*, derived from such species as *S. arborescens* (Aublet) Pittier and *S. auriculata* Poeppig, both of which have monomorphic stamens. However, I doubt that the situation is anything so simple and I have no "hard" evidence on which even to speculate profitably with respect to the true relationship of these genera. Similarly, the order of the species in the following treatment is largely arbitrary, but generally, evolutionary loss of flower parts is viewed as derived and connation of parts more advanced than totally free members of a series.

POLLEN MORPHOLOGY

In my monograph of *Swartzia*, I described pollen shapes (Cowan, 1968:6) as "globose . . . to oval, elliptic, deltoid-globose, or deltoid." These forms were from observations of pollen in lacto-phenol aniline-blue on slides prepared by an inexperienced technician (the author). I am now convinced that deltoid-globose or deltoid grains do not occur in the genus or its near-relatives. This conclusion is based on study of the pollen of fourteen species of *Swartzia*, representing all the major subgeneric groupings, four species of *Bocoa*, two of *Aldina*, and one each of *Zollernia*, *Lecointea*, *Candolleodendron*, and *Holocalyx*. I am greatly indebted to Joan Nowicke, Julianne Piraino, and Dieter Wasshausen for the preparation of the pollen samples for study by both scanning electron and light microscopy, as well as for their consultative assistance in my analysis of the data.

I undertook this preliminary review of the pollen of the Swartzieae because of my long held suspicion that this collection of genera is an unnatural assemblage which has two characters in common but whose members are not otherwise closely related—an entire calyx and an indefinite number of stamens. It seemed possible that palynology might be helpful in sorting out the several taxa. However, this has not proven to be the case and this fact, in addition to greater familiarity with the constituent genera, leads me to believe now that there may indeed be considerable evolutionary relationship among them. Certainly pollen morphology does not refute this viewpoint, for the similarities palynologically are great.

To document this conclusion and to provide a brief summary of the diversity observed among the pollens of the limited sampling of species enumerated below, the following account and illustrations are offered. It is not intended to be a comprehensive, analytical description of pollen morphology in *Bocoa* or of any of its relatives. Rather, it is hoped that this presentation, however incomplete, will stimulate further, more detailed palynological investigations of the caesalpinoid legumes.

All species examined had pollen grains which were: monads with the longest axis ca. 18–30 μm , spheroidal to subprolate or prolate, 3-colporate, the colpi short, elongate, or syncolpate, the os mostly circular and frequently prominent, sometimes bridged by the ektexine, ektexine more or less psilate, punctate, finely or coarsely rugose, or striato-reticulate.

Based on a combination of colpus length and ektexine pattern, five pollen types can be recognized. Unfortunately, these groupings, appear to correlate with nothing else and certainly provide no new insights into the phylogeny of the Swartzieae. Also, it should be emphasized that these pollen types are not well separated and that palynological investigation of additional species of either *Bocoo* or *Swartzia* may reduce the already limited distinctions among these groupings:

GROUP I: Colpi short or elongate but not syncolpate.

Type I-A: Ektexine rugose.

Type I-B: Ektexine striato-reticulate, sometimes very finely so.

Type I-C: Ektexine punctate.

GROUP II: Colpi syncolpate.

Type II-A: Ektexine rugose.

Type II-B: Ektexine punctate.

Following is a listing of the species examined in each pollen-type, the number of the illustration in parentheses just after each name, any special notes about the morphology, citation of the voucher collection, and the source herbarium for the sheet sampled:

| | Comments | Voucher |
|-------------------------------|--|---------------------------|
| <u>Species of Type I-A:</u> | | |
| <i>Bocoo alterna</i> (Fig. 1) | | Ducke 24203 (US) |
| <i>B. mollis</i> (Fig. 2) | | Blanchet 2774 (G) |
| <i>B. prouacensis</i> | | Stahel 69 (G) |
| <i>B. racemulosa</i> (Fig. 3) | | Snethlage 10058 (G) |
| <i>Swartzia apetala</i> | Thick-walled grains | Santos et al. 24166 (US) |
| <i>S. aptera</i> | Many grains abnormal | Maguire et al. 47056 (US) |
| <i>S. brachyrachis</i> | Some grains syncolpate, others not | Ducke 17038 (US) |
| <i>S. flaemingii</i> (Fig. 4) | Finely rugose | Froes 11753 (US) |
| <i>S. guianensis</i> (Fig. 5) | Very coarsely rugose and thick-walled | Boyan 67 (US) |

| | Comments | Voucher |
|--|---|-----------------------------|
| <u>Species of Type I-B:</u> | | |
| <i>S. amplifolia</i> | Very finely striato-reticulate | Klug 3122 (US) |
| <i>S. panacoco</i> (Fig. 6) | Finely reticulate | Cardona 1142 (US) |
| <i>S. cuspidata</i> (Fig. 7) | Os prominent | Maguire et al. 60409 (US) |
| <i>S. jorori</i> (Fig. 8) | | Cardenas 5211 (US) |
| <i>S. arborescens</i> (Fig. 9) | Very finely reticulate, appearing psilate by light microscopy | Lizot s.n. (US) |
| <i>S. leptopetala</i> | Finely striato-reticulate | Wurdack et al. 41367 (US) |
| <u>Species of Type I-C:</u> | | |
| <i>Aldina latifolia</i> (Fig. 10) | | Maguire/Wurdack 35595 (US) |
| <i>A. macrophylla</i> | | Wurdack/Adderley 43431 (US) |
| <i>Zollernia vogelii</i> (Fig. 11) | | Handro 45344 (US) |
| <i>Cyathostegia matthewsii</i> (Fig. 12) | | Ferreya 8911a (US) |
| <u>Species of Type II-A:</u> | | |
| <i>Swartzia benthamiana</i> (Fig. 13) | Thick-walled with os prominent | Irwin 57641 (US) |
| <u>Species of Type II-B:</u> | | |
| <i>Swartzia panamensis</i> (Fig. 14) | Punctate | Standley 55317 (US) |
| <i>S. grandifolia</i> | Coarsely punctate | Holt/Blake 673 (US) |

It is interesting to note that all the species of *Bocoa* have the same pollen-type, in common with several *Swartzia* species representing disparate phylogenetic groupings into which the genus is divided. Also the species of *Aldina*, *Cyathostegia*, and *Zollernia* have similar pollen morphology which apparently is slightly different from that of all other species examined. (*Cyathostegia* is now considered a separate genus but was earlier viewed as a part of *Swartzia*.)

The pollens of the three other genera in this complex do not fit into the "classification" above. The pollens of *Lecointea* (Ducke 1702-US) and *Holocalyx* (Pedersen 1422a-US) are more similar to each other than to those of any of the other taxa studied: under light microscopy the grains appear thin walled, more or less psilate, 3-colporate, the colpi not continuous at the poles. On the other hand, the pollen of *Candolleodendron* (Froes 32364-US) is intermediate in several respects, just as is the gross morphology of other parts of the plant: the grains are prolate and rugose but some are syncolpate while others (fewer) are not.

The following figures are arranged by pollen-type to facilitate review of the observations made. The arrangement represents, then, an attempt to organize the data for reporting purposes, rather than to suggest phylogenetic relationships of the taxa in each grouping or between groupings.

SYSTEMATIC TREATMENT

Bocoa Aublet

Bocoa Aublet, Pl. Guiane Fr. Suppl. 38, t. 391. Jun. 1775.

Trischidium Tulasne, Ann. Sci. Nat. (Ser. 2) 20:141, t. 4. Sep. 1843.

Shrub or small to large tree up to 30 m tall and 25 cm in diameter, the wood and leaves foetid, the branchlets glabrous or strigulose to tomentulose and glabrescent, the stipules minute and more or less triangular or lanceolate and up to 5 mm long; leaves 1- to 9-foliolate, imparipinnate, the petioles and rachis terete or occasionally flat or canaliculate on the upper surface, leaflets alternate to opposite, the blades glabrous to tomentulose, oval, elliptic, rounded, sometimes ovate-elliptic or lanceolate-elliptic, the base rounded to acute, the apex acute to acuminate or obtuse and retuse to emarginate; inflorescences racemose, infrequently compound racemes, ramuligerous just below the leaves of the current season, or occasionally axillary, sometimes very short but up to 10 cm long, the axis glabrous, puberulous, strigulose, or tomentulose, the pedicel scars strongly raised, the bracts caducous to persistent, triangular to semicircular, about 1 mm long and wide; bracteoles absent; pedicels 0.5–8 mm long at anthesis, becoming nearly twice as long with mature fruits, pubescent like the inflorescence axis; buds ellipsoid to oblong-ellipsoid, more or less pubescent externally, glabrous within, opening into 3 or 4 segments, free or remaining united in basal half, reflexed to strongly revolute after anthesis; petal present or lacking, white and usually glabrous, caducous to persistent, the claw 2–6 mm long, the blade round to oblate, 4–8 mm long and 3–7 mm wide; stamens 7–30, uniform, the filaments glabrous, sometimes shortly united basally, 2–6 mm long, the anthers oblong, basifixed, 1.5–4 mm long, 0.5–0.9 mm wide, glabrous; gynoeceium glabrous to densely strigulose, the stigma truncate to capitellate, sometimes obliquely so, the style about as long as the elliptic ovary, the ovules 10–14, in two rows but only the one nearest the style maturing, the gynophore basentric, to 2 mm long; fruit oval, inflated, one-seeded, the surface usually reticulate-veined, glabrous to densely strigulose, 1–3 cm long, the seed yellow brown, tan, or black, oval, arillate in two species but usually exarillate, the funicle elongate (to 3 m) in the type species.

Type-Species: *Bocoa prouacensis* Aublet, Pl. Guiane Fr. (Suppl.) 38, t. 391. 1775.

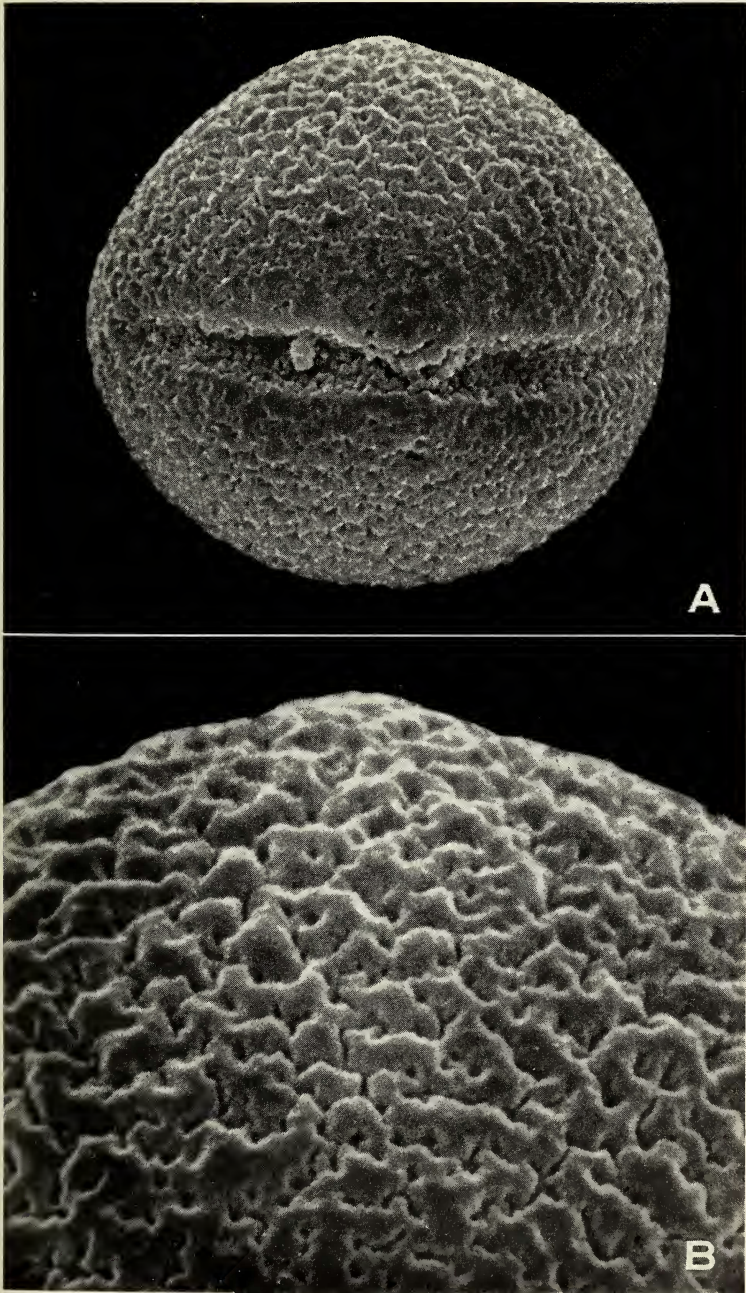


FIG. 1. *Bocoa alterna*—Type I-A. a. Equatorial view. $\times 3500$. b. Portion of surface. $\times 10,000$.

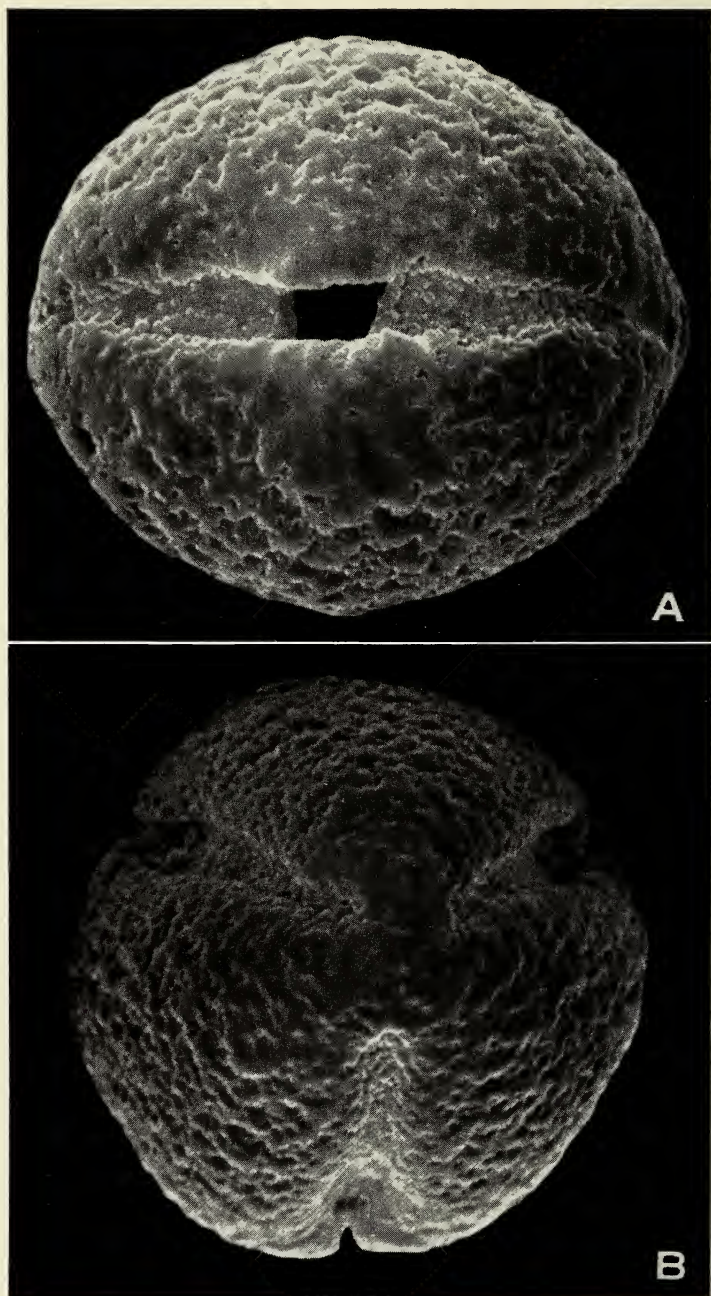


FIG. 2. *Bocoa mollis*—Type I-A. a. Equatorial view, showing prominent os. $\times 3900$. b. Polar view. $\times 3900$.

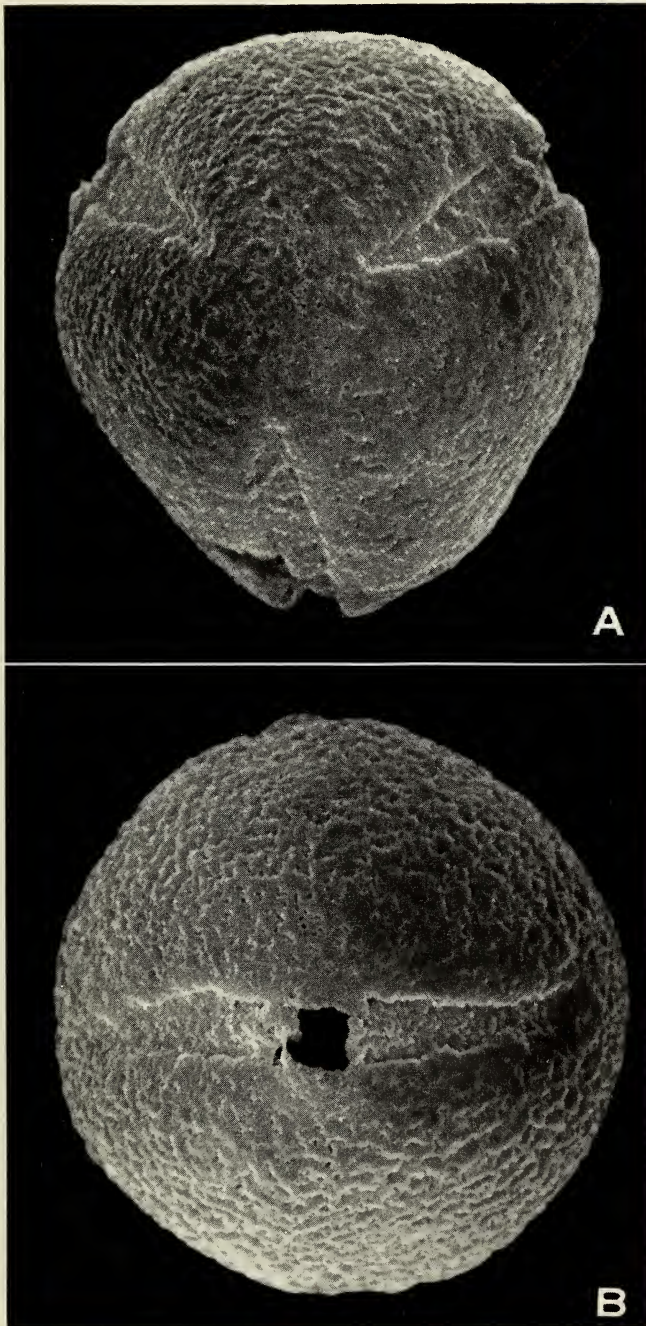


FIG. 3. *Bocoa racemulosa*—Type I-A. a. Polar view, showing short colpi. $\times 3700$. b. Equatorial view. $\times 3700$.

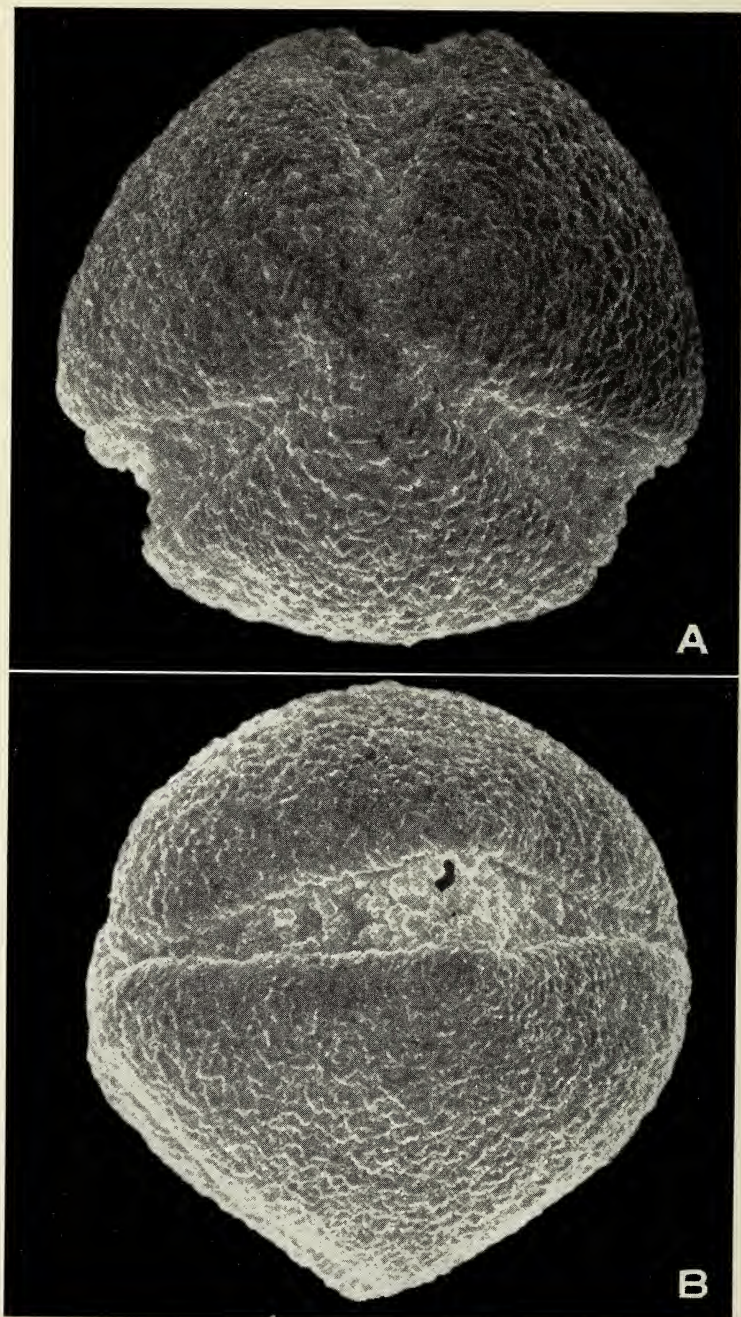


FIG. 4. *Swartzia flaemingii* var. *psilonema*—Type I-A. a. Polar view. $\times 3000$. b. Equatorial view. $\times 3000$.

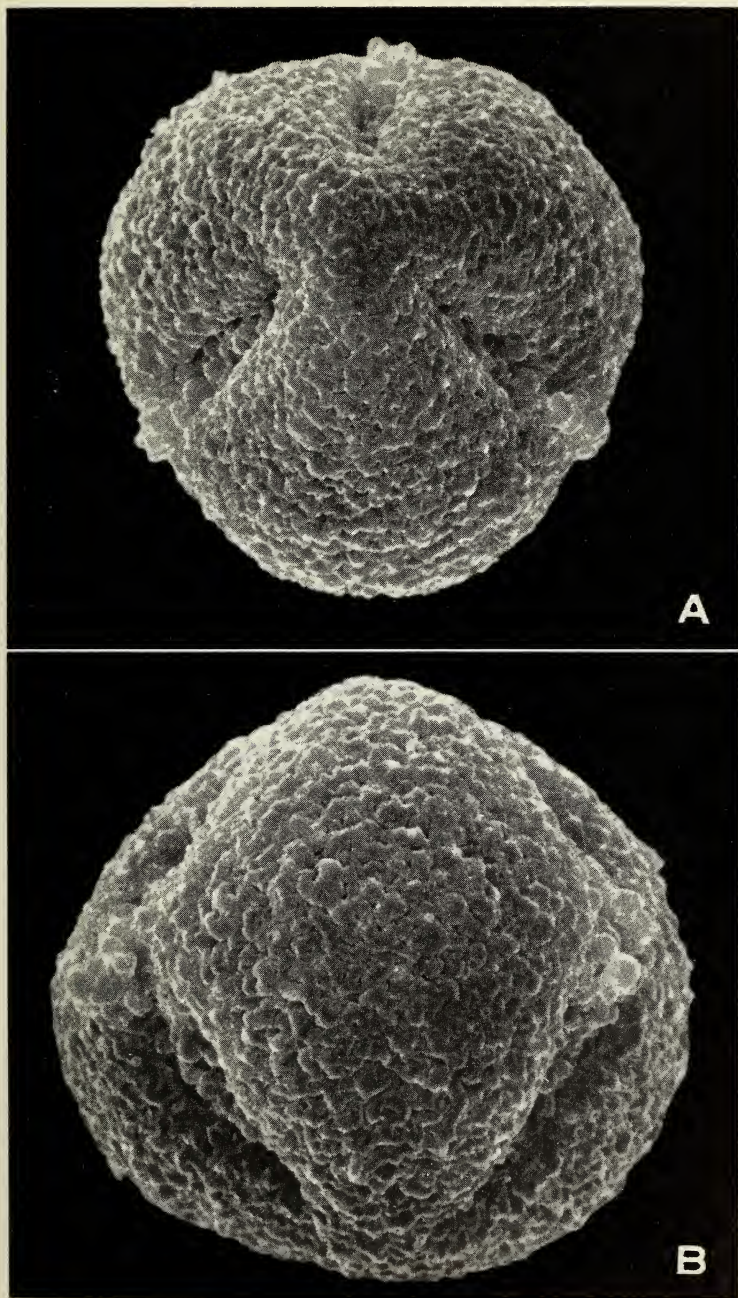


FIG. 5. *Swartzia guianensis*—Type I-A. a. Polar view. $\times 3000$.
b. Slightly oblique equatorial view, showing very coarsely rugose
ektexine. $\times 3000$.

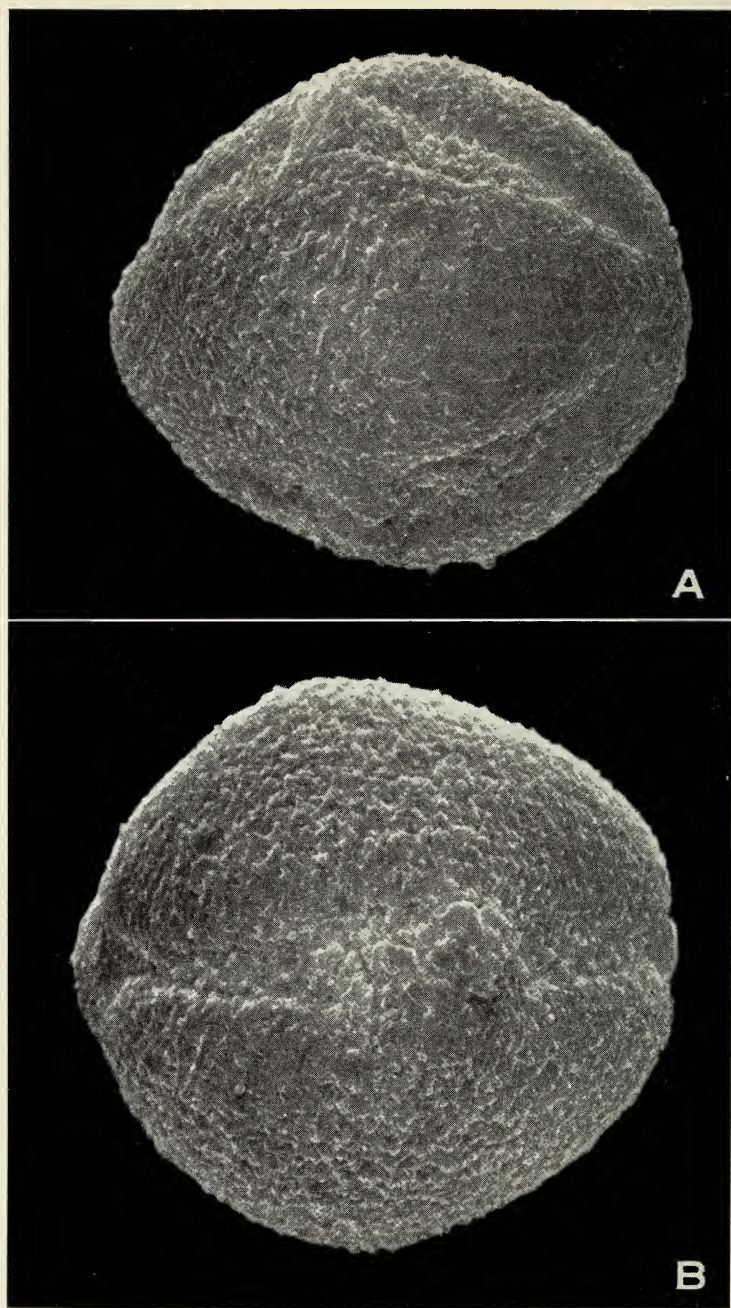


FIG. 6. *Swartzia panacoco* var. *cardonae*—Type I-B. a/b. Equatorial views, $\times 3000$.

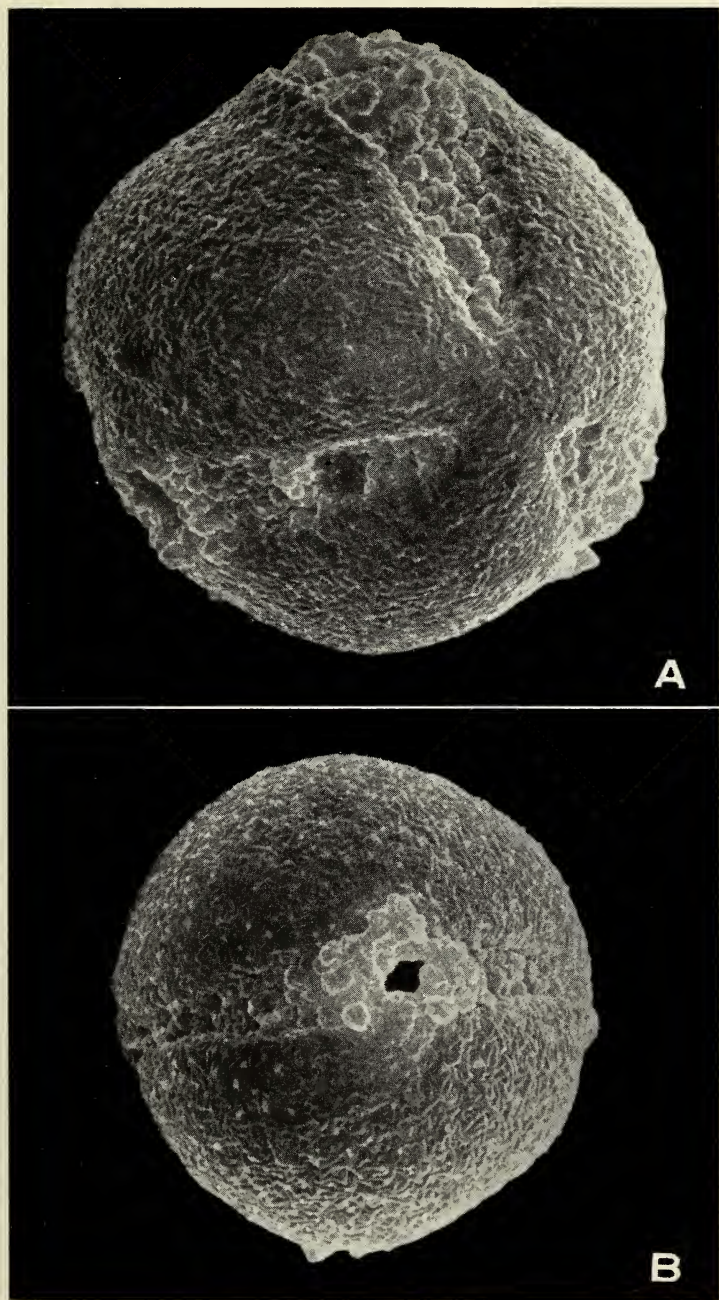


FIG. 7. *Swartzia cuspidata*—Type I-B. a. Oblique polar view, showing striato-reticulate ectexine. $\times 3000$. b. Equatorial view. $\times 3000$.

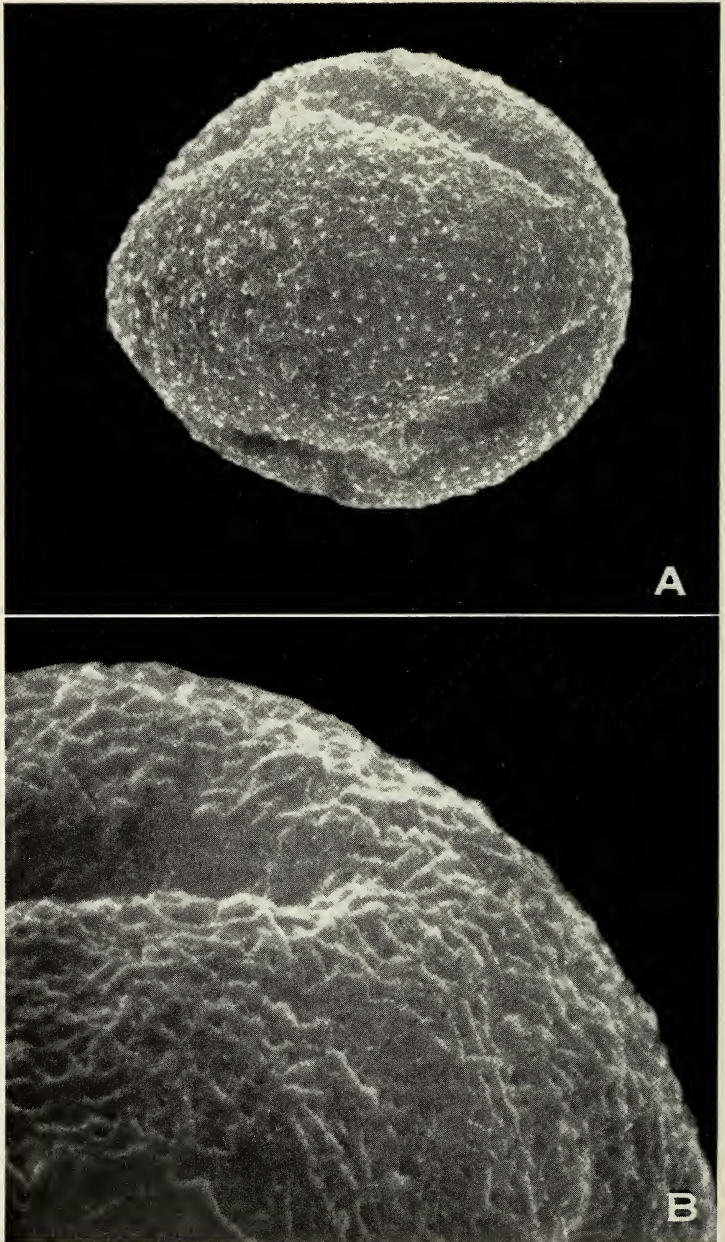


FIG. 8. *Swartzia jorori*—Type I-B. a. Oblique equatorial view. $\times 3000$. b. Portion of surface of ektexine, showing relatively narrow, interwoven muri. $\times 10,000$.

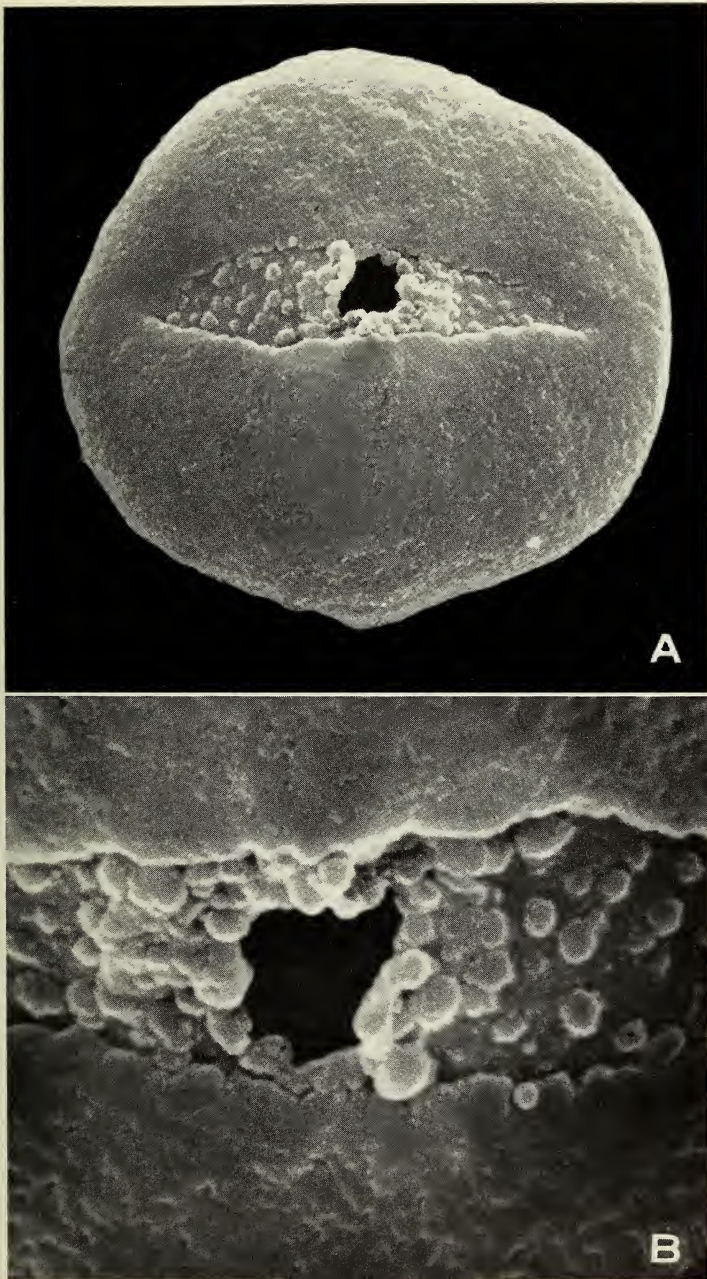


FIG. 9. *Swartzia arborescens*—Type I-B. a. Equatorial view, showing prominent os and discrete orbicules. $\times 3600$. b. Enlargement of mid-section of colpus. \times ca. 10,000.

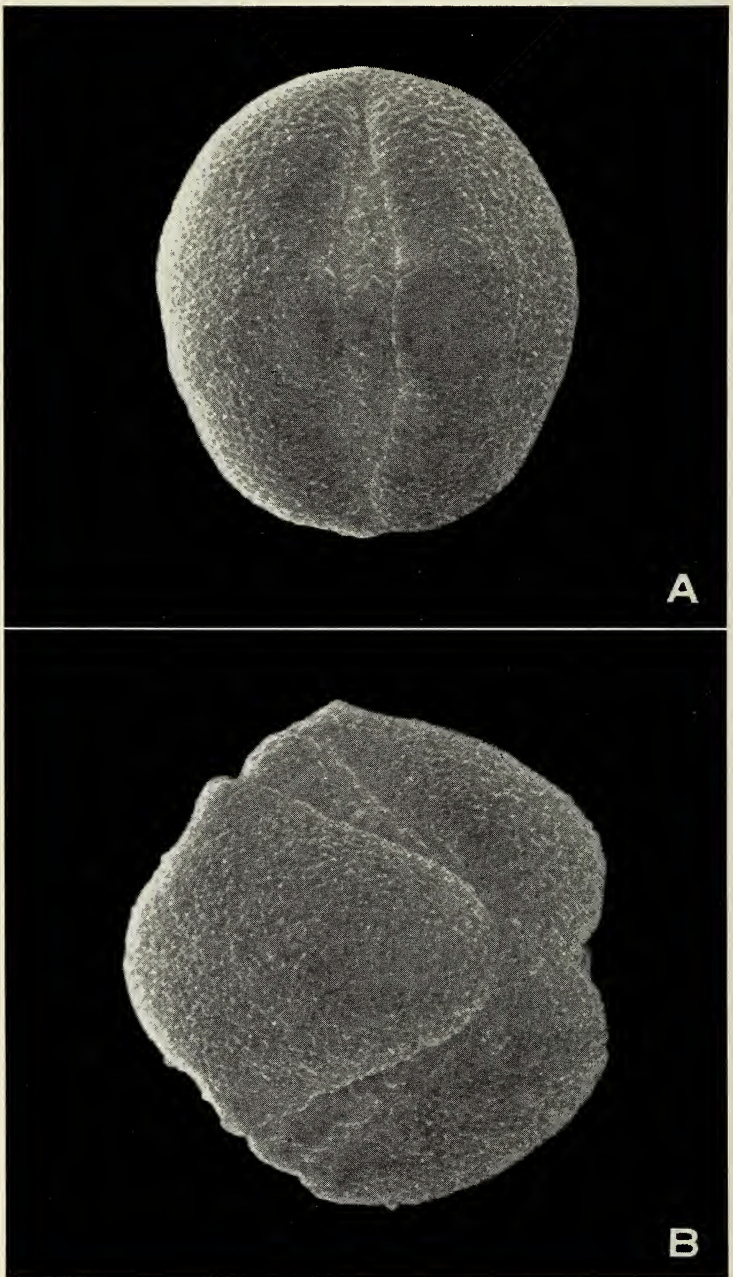


FIG. 10. *Aldina latifolia*—Type I-C. a. Equatorial view. $\times 3000$.
b. Oblique polar view. $\times 3000$.

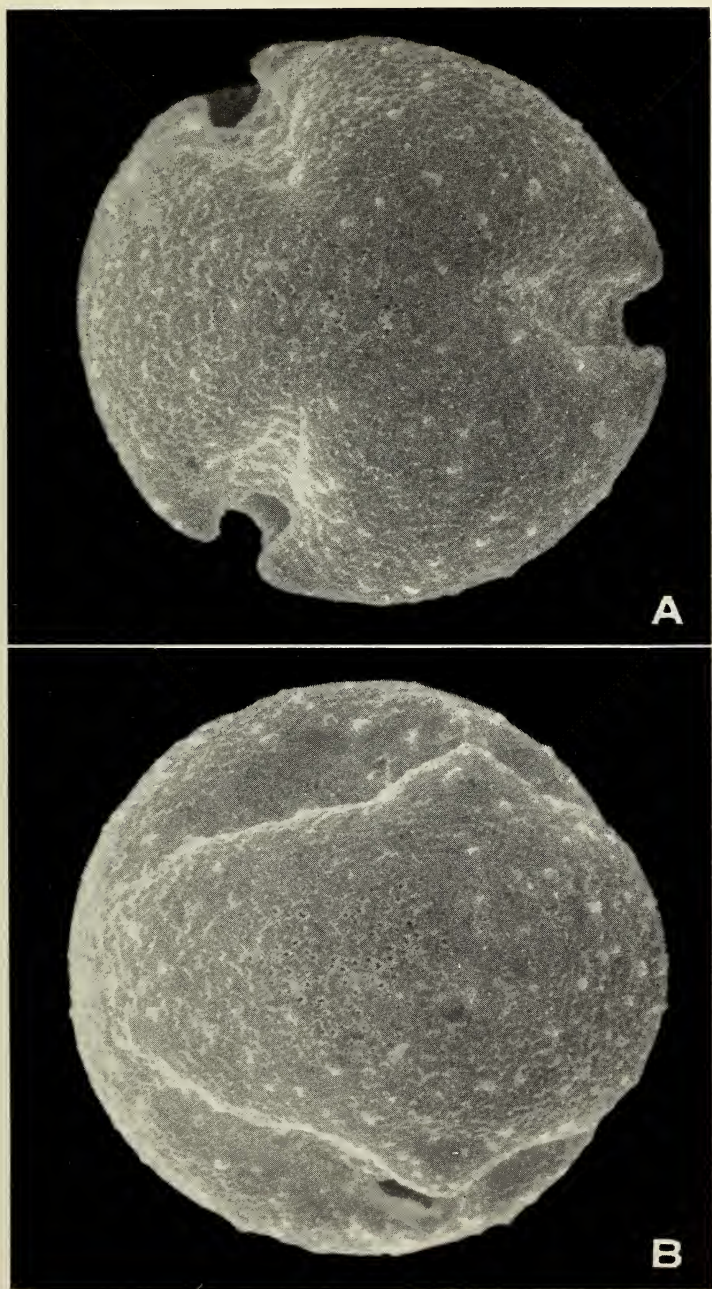


FIG. 11. *Zollernia vogelii*—Type I-C. a. Polar view. $\times 3000$. b. Slightly oblique equatorial view. $\times 3000$.



FIG. 12. *Cyathostegia matthewsii*—Type I-C. a. Slightly oblique equatorial view. $\times 3000$. b. Equatorial view. $\times 3000$.

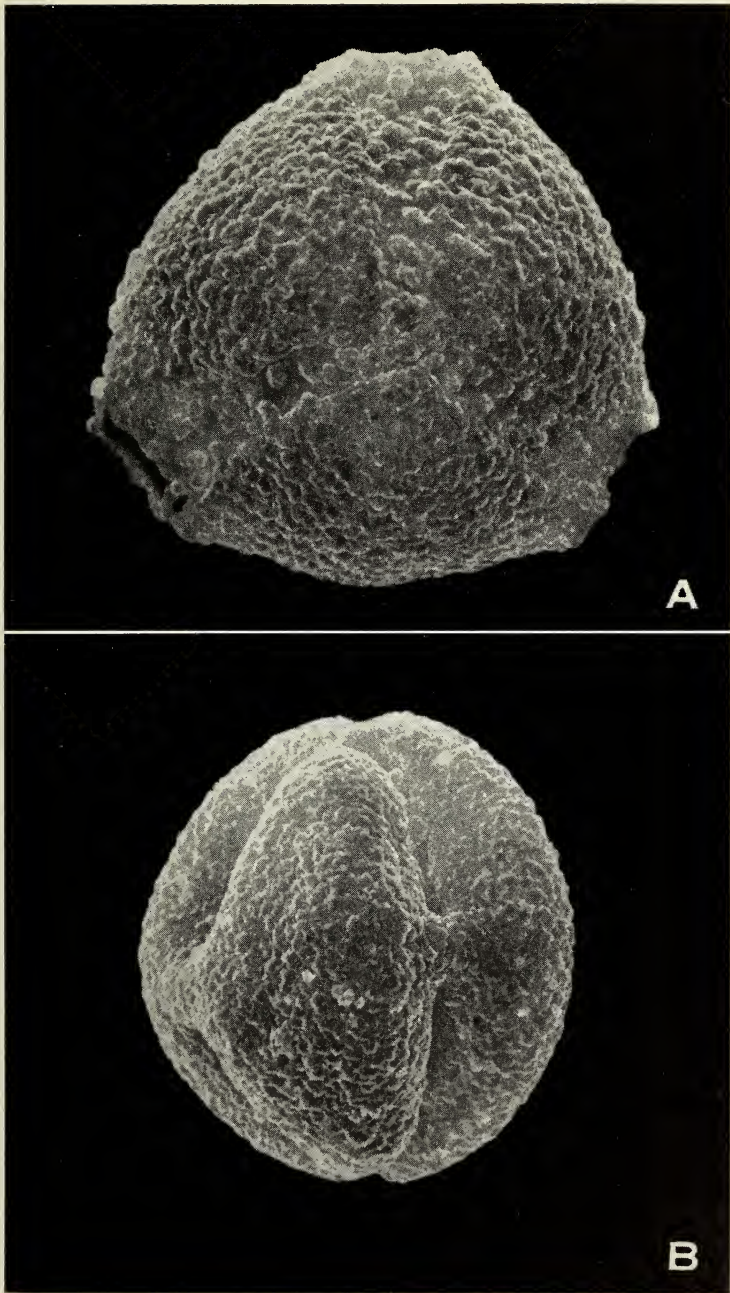


FIG. 13. *Swartzia benthamiana*—Type II-A. a. Polar view, showing syncolpate condition. $\times 3000$. b. Equatorial view. $\times 3000$.



FIG. 14. *Swartzia panamensis*—Type II-B. a. Polar view, showing syncolpate condition. $\times 3000$. b. Oblique equatorial view. $\times 3000$.

KEY TO THE SPECIES

1. Leaves unifoliolate or trifoliolate 2
 Leaves with more than 1-3 leaflets 4
2. Flowers lacking a petal; leaf rachis and petioles about equal in length or leaves unifoliolate; seeds obviously arillate; large trees 14 m or more tall 3
 Flowers with a petal; leaf rachis several times as long as the petioles; seeds exarillate; shrub or small tree 3. *B. racemulosa*
3. Leaves trifoliolate, the stipules deciduous, lanceolate, 3-4.5 mm long; inflorescence tomentulose; stamens 25-30; funicle not elongated 4. *B. viridiflora*
 Leaves unifoliolate, the stipules persistent, broadly triangular, 1.5 mm or less in length; inflorescence glabrous; stamens 7-10; funicle 1.5-3 m long 5. *B. prouacensis*
4. Leaflets alternate, the apices acute to acuminate, about 7-13 cm long 5
 Leaflets opposite to subopposite, the apices obtuse to rounded, usually at least some emarginate or retuse, 0.5-5 cm long 6
5. Petal deciduous or caducous; stamens 13-15; stigma obliquely capitellate; inflorescence 30-50 mm long; calyx segments free throughout their length 1. *B. alterna*
 Petal persistent even with old flowers; stamens 6-11; stigma truncate; inflorescences 3-10 mm long; calyx segments not separating in basal $\frac{1}{4}$ of length 2. *B. limae*
6. Branchlets, lower surface of leaflets, and inflorescence axes puberulous to tomentulose; leaflets 35-55 mm long, the lower ones oval to elliptic; inflorescence axes 9-20 mm long; calyx segments becoming strongly revolute; ovary and fruit glabrous ... 6. *B. mollis*
 Branchlets, lower surface of leaflets, and inflorescence axes minutely strigulose, glabrous or glabrescent; leaflets 3-22 mm long, the lower ones round; inflorescence axes 2-2.5 mm long; calyx segments reflexed; ovary and fruit strigulose 7. *B. decipiens*

1. *Bocoa alterna* (Bentham) Cowan, comb. nov.

Swartzia alterna Bentham, Hook. Jour. Bot. 2:89. 1840.

Description: Shrub or small tree 3-8 m tall, the trunk slender, to 10 cm in diameter, the bark when bruised with a foetid odor, the branchlets puberulous to strigulose, sometimes glabrescent, the stipules usually persistent, more or less triangular 0.3-0.4 mm long, strigulose externally; petioles terete to subterete, (5-)12-18(-25) mm long, more or less puberulous, sometimes glabrescent, the rachis (3-)6-8(-11.5) cm long, terete to subterete, more or less puberulous; leaflets (3-)5-7, subopposite to alternate, always with one terminal on the rachis, the petiolules (1-)2-4(-6) mm long, usually sparingly puberulous, the blades mostly elliptic to ovate-elliptic, sometimes narrowly elliptic, lanceolate-elliptic, or ovate (4.5-)7-12(-20.5) cm long, (2.8-)3.5-6(-7.5) cm wide, the base

cuneate and acute or rounded but finally acute, the apex acute to acuminate with the tip acute to obtuse, usually glabrous except puberulous on the costa above, occasionally soft-puberulous on the undersurfaces generally, often somewhat lucid on one or both surfaces, the venation prominulous on both surfaces or subobscure above, the costa impressed on the upper surface, salient beneath; inflorescences (1-)3-5 (-8) cm long, racemose or sparsely branched panicles of racemes, usually several arising together at the same node below the leaves of the current season but sometimes also axillary, the axis strigulose or puberulous, the flower scars prominently raised, the bracts about triangular and 1 mm long and wide, persistent or tardily deciduous, the pedicels 4-7 mm long in flower, 6-13 mm long in fruit, sparingly strigulose or puberulous, the buds 5-6 mm long, 3 mm in diameter, ellipsoid, sparsely strigulose except for the tufted apex; calyx segments 3 or rarely 4, free to the base, revolute tightly at anthesis, glabrous on the inner surfaces; petal one, white, glabrous, obovate to oblanceolate, the claw (1-)3-6 mm long, the blade 5-8 mm long, 3-5 mm wide; stamens (12-)13-15(-18), the filaments filiform, 3.5-5 mm long, usually free but sometimes shortly joined basally, the anthers narrowly oblong, 3-4 mm long, 0.7-0.8 mm wide; gynoecium glabrous or occasionally with a few hairs on the ovary and rarely puberulous, the stigma obliquely capitellate, the style 3-5.5 mm long, the ovary oblong, 1.5-4.5 mm long, 1-2.5 mm wide, the gynophore 0.8-2 mm long, ovules 14-16 in each ovary but only one (usually nearest the style) maturing; fruits dehiscent, usually glabrous, rarely puberulous, more or less reticulate-veined on the surface, oval to round in outline, 1-2 cm long, 1-1.5 cm wide, the seed black, oval to oblong-oval, 8-10 mm long, 5-5.5 mm in diameter, exarillate.

Type-Collection: L. Riedel 1 (holotype K), "Barra do Rio Negro in Brasilia." The specimens cited below as "Riedel s.n." are from the type locality and may be isotypes.

Distribution: Guyana, Amazonian Brazil, and western Peru in dense primary or open, dry secondary forest on sandy or clay soils above annual flooding by the rivers in the lowlands and up to 800 m elevation.

Discussion: Since there are small local morphological differences among the collections representing the species *sensu lato*, the following are cited under each of several unnamed "phases" I have distinguished. They are not worthy of formal recognition but should not be passed over without notice.

KEY TO PHASES OF *B. ALTERNA*

- | | |
|--|-------------------------|
| 1. Leaflets soft-pubescent on the lower surfaces | |
| "Pubescent Leaflet Phase" | |
| Leaflets glabrous or minutely puberulous on costa | 2 |
| 2. Fruits pubescent | "Pubescent Fruit Phase" |
| Fruits glabrous | 3 |
| 3. Fruits about 10 mm long on pedicels 4-5 mm long | |
| "Small Fruit Phase" | |
| Fruits 15-20 mm long on pedicels 6-12 mm long | 4 |

4. Leaflets long-acuminate, narrowly elliptic
 "Acuminate Leaflet Phase"
 Leaflets acute to acuminate, elliptic, ovate-elliptic, or lanceolate-
 elliptic "Glabrous Phase"

(1) The "Glabrous Phase" is glabrous in most parts, particularly the leaflets and the gynoeceum. Collections representing this phase are: GUYANA: basin of Essequibo R., near mouth of Blackwater Creek, December 1937, A. C. Smith 2828 (A, K, NY); Wawitau, Kanuku Mtns., September 1948, Wilson-Browne 176 (Record No. 5669 (K, NY). PERU: Depto. Junin, Puerto Bermudez, July 1929, Killip & Smith 26502 (US). BRAZIL-AMAZONAS-vicinity of Manaus: Igarapé do Bindá, April 1956, Coelho (INPA No.) 3740 (US); Barcelos, September 1962, Duarte 6978 (US); Flores, January 1941, Ducke 371 (MADw); Cachoeira Grande, April 1937, Ducke 454 (A,F,IAN,MG,MO,NY,US); Cachoeira below Tarumá, 21 September 1956, Francisco & Luiz 4188 (IAN); Estrada do Mundú, February 1945, Froes 20465 (IAN,K,NY,US); Pai Raimundo, Rio Demeni, Froes & Addison 29016 (IAN); Rio Tarumá, Aug. 1949, Froes 24946 (IAN); Flores, March 1924, Kuhlmann 96 (P, U) and 1607 (RB,US); Cachoeira baixa de Tarumá, September 1956, Mello & Coelho (INPA No.) 4188 (US); Kms 65-70 da Rodovia, Manaus-Itacoatiára, 22 Oct. 1963, Oliviera 2742 (IAN); Estrada do Aleixo, March 1947, Pires 213 (US); Road Igarapé Leaõ 25 km north of Manaus, November 1966, Prance et al. 3137 (U,US); estrada Manaus-Itacoatiara km 70, October 1960, Rodrigues & Coelho 1877 (US); Estrada do Tarumá, January 1962, Rodrigues & Chagas 4112 (US); Igarapé do Buião, November 1962, Rodrigues & Chagas 4723 (US); Km 22 da estrada Manaus-Caracaroí, November 1962, Rodrigues et al. 4811 (US); Manaus, Schwacke 3942 (RB); between Santarem and Barra do Rio Negro along the Amazon River, October 1850, Spruce s.n. (BM,G,K,NY,RB); Paruná-mirí dos Ramos, Oct. 1850, Spruce 1106 (K,P). PERNAMBUCO: Recife, Dois Irmãos, Feb. 1948, Ducke 2116 (IAN).

(2) The "Pubescent Leaflet Phase" has leaflets that are softly pubescent on the undersurfaces, but like the typical phase in other respects. All the collections are from BRAZIL-AMAZONAS-Manaus: B.A.M., BR 17, Km 9, December 1955, Dionisio 3076 (MG); Flores, October 1936, Ducke 296 (A,F,IAN,K,MG,MO,NY,US); between the city and Flores, July 1929, Ducke (HJBR No.) 23342 (G,K,RB,US); near the city, August 1931, Ducke (HJBR No.) 24203 (G,K,P,RB,U,US); road to Aleixo, August 1936, Krukoff 7944 (A,BM,G,K,MO,P,U,US); Margem do Igarapé do Buião, July 1956, Luis 13979 (IAN); Sept. 1945, Pires & Black 930 (IAN); Barra do Rio Negro, Riedel s.n. (A,G,K,P); Igarapé do Santa Maria, June 1962, Rodriguez and Chagas 4473 (US), cultivated at Rio de Janeiro, Dec. 1878, Glaziou 9767 (K,P,U).

(3) The "Acuminate Leaflet Phase" differs in having relatively narrower leaflets that have long-acuminate apices and it occurs in the Kanuku Mountains of Southwestern Guyana: March-April 1938, A. C. Smith 3147 (F,IAN,K,NY,P,U,US) and 3575 (G,F,IAN,K,MADw,MO,

NY,U,US). One additional Guyana collection without locality should be assigned here: Robt. Schomburgk 293 (Rich. Schomburgk 585) (K,P).

(4) The "Pubescent Fruit Phase" is separable only by the puberulous fruits and is represented by a single collection from Guyana: basin of Essequibo River near mouth of Onoro Creek, December 1937, A. C. Smith 2772 (A,F,G,K,MADw,MO,NY,U,US).

(5) The "Small Fruit Phase" has noticeably smaller fruits, somewhat shorter pedicels, and longer inflorescences: Serra do Navío, Terr. do Amapá, Rio Amapari, Brazil, November 1954, Cowan 38157 (F,NY).

(6) The "Unifoliolate Phase" is identical with the "typical phase" except that the leaves are uniformly unifoliolate. The only two collections are from the Brazil-Guyana boundary in the Akarai Mountains, at 600–800 m elevation between the drainages of the Rio Mapuera and Shodikar Creek: A. C. Smith 2991 (A,F,G,K,MADw,MO,NY,U,US) and 2996 (A,F,G,K,MO,NY,P,U,US).

The closest relationship of *B. alterna* is with *B. limae*, which shows once again a familiar distributional pattern (in the legumes at least)—a wide-ranging species with a disjunct, very similar, related species in the coastal forest of southeastern Brazil. The two taxa differ in the length of the inflorescence, persistence of the petal, and the post-anthesis union of the calyx-segments.

2. *Bocoa limae* Cowan, sp. nov.

Description: Frutex 1.5–2 m altus, trunco ca. 3 cm diametro, ramulis strigulosis, stipulis caducis, non visis; petioli 3–4(–6) mm longi, sparse strigulosi, subteretes, rhachibus 4.5–8 cm longis, sparse strigulosi, subteretibus; foliola 4–7, alterna, imparipinnata, petiolulis 1–2 mm longis, laminis superioribus amplioribus, 6–20 cm longis, 2.5–7.5 cm latis, laminis inferioribus minoribus, 3–5.5 cm longis, 1.5–3 cm latis, laminis omnibus ellipticis, ad basim angustatis acutis vel tandem obtusis, ad apicem argute vel obtuse acutis, sparse strigulosi infra sed mox glabrescentibus, lucidis, manifeste venulosi in ambobus paginis; inflorescentiae ramuligerae vel axillares, axe 3–5(–10) mm longo, striguloso, bracteis deciduis, triangularibus, strigulosi extus; pedicelli 4–5.5 mm longi, strigulosi, alabastris oblongis, sparse strigulosi; calycis segmenta 3 vel 4, revoluta, ad basim incomplete fissa; petalum unum, album, persistens, glabrum, unguiculo 3.5–4 mm longo, lamina rotundata sed attenuata ad basim, 5–7 mm diametro; stamina 6–11, filamentis 3–5 mm longis, antheris anguste oblongis, ca. 4 mm longis et 1 mm latis; gynoeceium glabrum, stigmatate truncato, stylo ca. 5 mm longo, ovario elliptico, ca. 3.5 mm longis et 1.8 mm latis, gynophoro ca. 1 mm longo; fructus ovalis, glaber, reticulatus, ca. 18 mm longus et 12 mm latus, rostellatus, semine uno, nigro, exarillato, ovali ca. 10 mm longo et 7 mm lato.

Type-Collection: A. Lima 65-4270 (holotype US, sheet no. 2639742, isotype IPA), "Bahia. Salvador. Areias em torno da Lagôa do Abaeté," Brazil, 26 January 1965.

Distribution: Coastal brush-forest from Pernambuco to Bahia, Brazil,

on sandy soils. BRAZIL-PERNAMBUCO: Recife, woods near Dois Irmãos, 29 October 1949, Lima 49-369 (IPA); along road to Aldeia, 17 March 1952, Lima 52-1007 (IPA, US); mata de Dois Irmãos, 2 June 1966, Soares 2185 (US).

Vernacular Name: "Feijao brabo" (Soares 2185).

Discussion and Etymology: There is a great resemblance of *B. limae* (named for the collector of most of the known material of the new taxon) to *B. alterna* but close examination reveals a number of differences in addition to the obvious geographic disjunction. Unlike its nearest relative, the new species has a very short inflorescence, at times the flowers almost seeming to arise from the branchlets directly; the calyx segments do not open completely, remaining partially united basally; the petal is persistent, even with quite old flowers; the stamens are fewer, and the stigma is truncate; vegetatively, the leaflets are obviously venulose and the costa is salient on both surfaces.

3. *Bocoa racemulosa* (Huber) Cowan, comb. nov.

Swartzia racemulosa Huber, Bol. Mus. Goeldi 5:395. 1909.

Description: Shrub or small tree, the branchlets sparingly strigulose minutely, glabrescent, the stipules not seen, the petioles 2–10 mm long, sparingly strigulose but glabrescent soon, rachis 2.5–6 cm long, glabrous, subterete; leaflets 1–3, the lateral ones smaller (6–11 cm long, 3–7 cm wide) ovate, with petiolules 1–3 mm long, the terminal leaflet 12–23.5 cm long, 5–12 cm wide, the petiolules 3–4 mm long, base of leaflets rounded-obtuse (some lateral ones) to rounded and acute, or simply acute, the apex sharply to bluntly acute, sometimes emarginate, glabrous, venation prominulous; inflorescences 2.5–3 cm long, ramuligerous, racemose, minutely strigulose, the bracts persistent, ovate-triangular, about 1 mm long, minutely strigulose externally; pedicels about 2.5 mm long in flower and 4 mm long with fruit, minutely strigulose sparingly, the calyx minutely strigulose externally, opening only about half of length in 2–4 segments, ca. 3.5–4 mm long, segments erect or somewhat reflexed, the calyx usually falling in one piece; petal white, glabrous, obovate, 7 mm long (fide Huber), cuneate-unguiculate; stamens 12–14, the filaments 2–3 mm long, the anthers oblong, 2.5–2.8 mm long, 0.5 mm wide; gynoecium glabrous, the stigma capitellate, the style 3.5 mm long, the ovary elliptic, ca. 2 mm long and 0.8 mm wide, the gynophore ca. 1 mm long; fruit ca. oval in outline and 1.5 cm long, 1 cm wide, reticulate-veined on surface, glabrous, the seed exarillate, black, oval-oblong.

Type-Collection: A. Ducke 7870 (holotype presumably in Brazil but not at Museu Goeldi in Belém (fide the curator), isotypes F,G), "in silvis flumenis Trombetas ad vicum Oriximiná, Pará," Brazil, 8 December 1906.

Distribution: Lowland forest of Pará in east-central Brazil, near the junction of the Amazon and the Rio Trombetas: São Jorge, Município de Faro, November 1950, Black & Ledoux 50-10669 (IAN,US); Orixi-

miná, 23 November 1907, Ducke 8865 (BM,G,MG); Rio Tapajoz, Mangabal, February 1917, Ducke 11184 (HAMP No. 16755) (BM,G, MG,P,RB,U,US); S. Luiz do Rio Tapajoz, December 1915, Ducke 11185 (HAMP No. 15856) (BM,MG,RB); Obidos, November 1919 (fl.), June 1926 (frt.), Ducke 11186 (G,K,P,RB,U,US); Rio Tapajoz, Villa Braga, November 1908, Snethlage 10058 (BM,G,MG).

Discussion: While clearly related to *B. alterna*, this species is easily distinguished by its dimorphic leaflets. The pair of lateral ones is ovate and about half the length of the elliptic terminal one. In addition, the calyx segments in *B. racemulosa* only separate about halfway and they are more or less reflexed, in contrast to the totally free, retrorsely revolute segments in *B. alterna*.

4. *Bocoa viridiflora* (Ducke) Cowan, comb. nov.

Swartzia viridiflora Ducke, Arch. Inst. Biol. Veg. 2:44. 1935.

Description: Tree to 30 m tall and 43 cm diameter, with glabrescent, lucid branchlets, strigulose at very early stages, the stipules deciduous, lanceolate, 3–4.5 mm long, 1–1.5 mm wide, strigulose externally at first but soon glabrescent; leaves glabrous, trifoliolate (unijugate and imparipinnate), the petioles 1–4 cm long, terete, the rachis 2–4.3 cm long, terete; lateral leaflets opposite, occasionally subopposite, petiolules 3–6 mm long, transversely rugose, the blades subcoriaceous, lucid, 7–15 cm long, 3–6.5 cm wide (the terminal leaflet larger), elliptic, the base acute, the apex acuminate to bluntly acute, costa and 3–5 pairs of primary veins more or less salient on both surfaces; inflorescences 5–9 cm long, to 20 cm long in fruit, ramuligerous, axes albo-tomentulose, the peduncle 3–4 mm long, the bracts persistent, darker colored, semicircular, cucullate, about 1 mm long and broad, puberulous externally; flowers greenish, fragrant, the pedicels tomentulose, about 1 mm long; calyx segments deciduous, sparingly tomentulose externally, glabrous on inner surfaces; petal absent; stamens equal, 25–30, the filaments 6 mm long, the anthers basifixed, oblong ca. 1.5 mm long and 0.5 mm wide, gynoecium glabrous, the stigma capitate, the style 3–4 mm long, the ovary oblong, 3 mm long 1.5 mm wide, the gynophore 1.5–2 mm long; fruits oval in outline, ca. 3 cm long and 1.5 cm in diameter, the surface tessellate-scaly, the “scales” darker, the seed oval, only slightly smaller than the fruits, the aril small.

Lectotype-Collection: A. Ducke (H.J.B.R. No.) 24219 (flowering portion). (Lectotype RB, isolectotypes F,G,K,MADw,NY,P,U,US), “circa Manáos (civ. Amazonas) in silvis loco alto ultra Flores,” Brazil, 29 November 1932.

Distribution: Vicinity of Manaus, Brazil, southern Guyana and Suriname, in riverine lowland forest. BRAZIL-AMAZONAS: Vicinity of Manaus above Flores, 18 April 1933, Ducke (H.J.B.R. No.) 24219 (fruiting portion) (F,G,MADw,NY,P,US) and 1 March 1946, Ducke 1923 (A,F,IAN,K,MG,NY,US). BRAZIL-PARÁ: Tinguelim km 21, 30

March 1970, Silva 3024 (IAN). GUYANA: "Plot 3, hill top 1000 feet high, 7 miles E. of Onoro mouth, Upper Essequibo," 30 September 1952, Guppy 304 (Record No. 7280) (NY). SURINAME: Fallawatra, 8 Nov. 1971, Jimenez-Saa 1568 (K).

Choice of a lectotype is required in this instance because Ducke included two collections under one number, probably from the same tree but this is not at all certain; both parts of the type collection are cited here.

The collection from Guyana is sterile but it almost certainly represents this species.

Vernacular Names: "Gombeira amarela" (Silva 3024).

Discussion: This is one of the two species of the genus which are characterized by apetalous flowers and arillate seeds. It is distinct from its near relative, *B. prouacensis*, by the number of leaflets, stipule size, and number of stamens. Like *B. racemulosa*, although less pronounced, *B. viridiflora* has trifoliolate leaves with the terminal one the largest. This species has the largest stipules, the longest inflorescences, and the largest number of stamens.

5. *Bocoa prouacensis* Aublet, Pl. Guiane Fr. Suppl. 38, t. 391. 1775.

Swartzia prouacensis (Aublet) Amshoff, Meded. Bot. Mus. & Herb. Rijks. Univ. Utrecht 52:40. 1939.

Swartzia minutiflora Kleinhoonte, Rec. Trav. Bot. Neerl. 22:408. 1925.

Description: Tree 14–30 m tall, the trunk 19–25 cm diameter, straight and cylindrical, the bark brownish-grey with small rectangular scales, the branchlets glabrous, the stipules persistent, rigid, 0.7–1.3 mm long and wide, broadly triangular-ovate, acute, glabrous; leaves glabrous, unifoliolate, the petiole subterete, non-alate, 6–16 mm long or occasionally totally suppressed, petiolules 4–7 mm long, transversely corrugate, the blades coriaceous, 9–18(–21) cm long, 4.5–8(–10) cm wide, mostly elliptic but sometimes elliptic-ovate or broadly ovate, sometimes asymmetric, the base rounded and obtuse to subobtuse, infrequently acute, the apex bluntly acute, infrequently acuminate, the costa and its primary branches more or less salient on both sides of the leaflet-blade; inflorescences 2–5 cm long, ramuligerous, axes glabrous, the bracts persistent, cucullate, broadly ovate, about 0.6–0.8 mm long and 1 mm wide, glabrous except for ciliolate margin, bracteoles lacking; pedicels 0.3–0.6 mm long, rarely to 2 mm long, glabrous, the calyx opening nearly to the base in three, more or less equal segments which often fall in one piece; petal absent; stamens 7–10, uniform, the filaments 4.5 mm long, the anthers oblong, 1.3–1.5 mm long, ca. 0.5 mm wide; gynoecium glabrous, the stigma capitellate, the style filiform, 1.7–2 mm long, the ovary 1.8–2 mm long, 0.8–1 mm broad, oblong, the gynophore 1–1.5 mm long; fruit oval in outline, 2.5–3 cm long, 1.5–2.5 cm wide, dehiscent, the seed yellow or light brown (fide Amshoff) 1–2 cm long, the aril white, lacinate, the funicle filiform, 1.5–3 m long.

Type-Collection: J. B. C. F. Aublet s.n. (BM), "Habitat in sylvis Caux," French Guiana.

Distribution: Suriname and French Guiana in lowland forest. SURINAME: Marechalskreek, 9 July 1921, BW 5441 (U) and 21 Jan. 1922, BW 5769 (U); Brokopondo District, 8 km ESE of Brownsweeg Village, 26 Mar. 1965, van Donselaar 2273 (U); Tapanahoni River, 11 Nov. 1918, Gonggrypp 4175 (IAN,U); Nassau Mts., 9 Mar. 1949, Lanjouw & Lindeman 2545 (U); Boven Coesewijne, ca. 20 km SW of Poika, Schulz 7926 (U); Sectie "O," 23 Apr. 1915, Suriname Forestry Department 342 (K,MO,U),—23 Oct. 1915, 1191 (U) (type of *Swartzia minutiflora* Kleinhoonte),—27 Oct. 1915, 1198 (K,MO,U),—Nov. 1915, 1434 (U),—22 Nov. 1915, 1560 (U),—26 Feb. 1916, 1660 (U),—22 Dec. 1916, 2552 (U),—5 Mar. 1917, 2743 (U,US),—22 Aug. 1918, 3974 (U),—2 Sept. 1918 3984 (NY,U,US),—4 Sept. 1918, 3986 (IAN,U),—9 Dec. 1918, 4185 (U),—30 May 1919, 4326 (U),—28 Nov. 1919, 4455 (MO,U),—28 Nov. 1919, 4477 (U),—21 Jan. 1920, 4521 (U),—6 Mar. 1920, 4569 (IAN,K,U,US),—3 Nov. 1920, 4781 (U),—12 Nov. 1921, 5556 (U),—17 May 1922, 5839 (K,NY,U),—16 Mar. 1923, 6084 (IAN,U); Brownsberg Forest Reserve, Suriname Forestry Department 6130 (NY,U); Sectie "O," Dec. 1942, Suriname Woodherbarium (Stahel) 69 (A,IAN,K,MADw,NY,U); Brownsberg Forest Reserve, 10 Oct. 1969, Tawjoeran 12581 (U). FRENCH GUIANA: St. Laurent, Feb. 1956, BAFOG 339M (U), 7236 (U), and 7249 (P,U), 7 Feb. 1956, Bena 1117 (U); Placeau no. 2—Carreau no. 56—Route de Mana," 3 Jan. 1956, French Guiana Forestry Department 7126 (NY,P,U), 26 Mar. 1956, 7415 (U); Sinnamary River, Crique Grégoire, 28 Apr. 1968, Oldeman B-1614 (P); Camopi River, 1 km downstream from Saut Ouasseye, 11 Dec. 1967, Oldeman 2625 (P); Karouany, 1859, Sagot 1210 (BM,K,P); without locality or date, Wachenheim s.n. (BM,K,P,US).

Vernacular Names: "Bois bobo," "caux bois boco" (Aublet s.n.); "boko" (Oldeman B-1614); "aie oudou" (F. G. For. Dept. 7126); "itikiboroballi hohorodikoro," "ijzerhart" (Sur. Woodherb. 69); "yzerhart" (Sur. For. Dept. 4326).

Discussion: *Bocoa prouacensis* is one of the two most frequently collected species in the genus and certainly one of the most distinctive. One characteristic alone separates it from all its relatives; the single seed in each fruit at the time it dehisces is suspended on a thread up to three meters long. (An interesting description of this phenomenon is given by Stahel in the *Journal of the New York Botanical Garden*, vol. 45:265–268. 1944). This attribute plus an obvious, fleshy aril is surely of some adaptive significance, probably for dispersal by animals. The aril in this species, and in the preceding, links the genus to *Swartzia*, most of whose species have arillate seeds. The unifoliolate leaves of *B. prouacensis* serve to separate it from all its near-relatives, the closest of which is probably *B. alterna*.

6. *Bocoa mollis* (Bentham), Cowan, comb. nov.

Swartzia mollis Bentham, Hook. Journ. Bot. 2:89. 1840.

Trischidium vestitum Tulasne, Ann. Sci. Nat. (Ser. 2) 20:141, t. 4. Sept. 1843.

Swartzia cearensis Ducke, Anais da Academia Brasileira de Ciencias 31: 295. 30 June 1959.

Description: Shrub or small tree 2–4 m tall, foetid in fresh state, the young branchlets tomentulose densely; stipules early caducous, minute, ca. 0.5 m long, densely strigulose; petioles 6–11 mm long, tomentulose, terete, the rachis 25–50 mm long, tomentulose, terete; leaves imparipinnate, the leaflets 5–9, 3.5–5.5 cm long, 1.5–3 cm wide, subopposite or rarely opposite, the petiolules 0.7–1.5 mm long, tomentulose, the blades oval to elliptic or ovate to lanceolate, the base rounded, obtuse or slightly cordate, the apex obtuse, retuse, to sub-emarginate, puberulous to tomentulose beneath, rarely only on costa, puberulous to strigulose above, the venation subobscure to barely prominulous, plane except the costa salient on lower surface; inflorescences ramuligerous, racemose, the axes 9–20 mm long, densely tomentulose-pilosulose, the bracts early deciduous, broadly triangular-ovate or semicircular in outline, about 1 mm long and wide, densely strigulose externally, glabrous within, the pedicels 4–12 mm long at anthesis, 7–15 mm long with mature fruits, pilosulose; buds elliptic in outline, subappressed-tomentulose, ca. 5 mm long and 3.5 mm diameter, the calyx opening only about half-way into 3 or 4 segments; petal one, deciduous to caducous, white, the claw 2–6 mm long, sparingly villosulose externally or glabrous, the blade glabrous, oblate, 4–7 mm long and 5–7 mm wide; stamens (12–)20–22, the filaments 4–7 mm long, slightly joined basally, the anthers narrowly oblong, 2–3 mm long, 0.7–0.9 mm wide; gynoecium glabrous except sometimes a few long hairs on ovary, the stigma capitellate, sometimes obliquely so, the style 2–3.5 mm long, the ovary elliptic, ca. 3.5 mm long and 2 mm wide, the gynophore ca. 1 mm long; fruit obliquely ellipsoid, beaked with the 1–2 mm long remnant of style, 10–15 mm long, 8–10 mm diameter, reticulate, the carpophore about 1–4 mm long; the seed tan to black, exarillate, 5.5–7 mm long, 4.5–5 mm diameter, shiny, ellipsoid to subrotund.

Type-Collection: J. S. Blanchet 2774 (holotype K, isotypes F (frag.), G,K,P) (also the type collection of *Trischidium vestitum* Tulasne). "In Brasilia prope Utinga, Fazenda in Certao de San Francisco," Bahia, 1839.

Distribution: Near-interior of Ceara and Rio Grande do Norte to Bahia, Brazil, on sandy soils in scrub forest. BRAZIL-CEARA: Baturité, 11 Apr. 1909, Ducke 1980 (BM,G,US); Itaitinga, Pé do Serrote da Pedreira, 11 August and 23 December, 1955, Ducke 2467 (IAN,INPA,K,MG,NY,US) (type of *Swartzia cearensis* Ducke) and Ducke 2582 (IAN,K,NY,RB,US); along the road from Morada Nova to Bixobá, 14 February 1960, Lima 60-3443 (IPA,US); no specific

locality, Dias da Rocha (HJBR No.) 11183 (RB); without locality or date, Allemão & Cysneiros 497 (P). RIO GRANDE DO NORTE: Açú, along the margin of the left bank of the Rio Açú, Lima 60-3505 (IPA). PERNAMBUCO: Margem da estrada Ibimirim-Joazeiro dos Candidos, Lima 50-700 (IPA); Maniçobal, Fazenda Contenda, 20 June 1952, Lima & Magalhães 52-1050 (IPA). BAHIA: Antonio B. de Oliveira (HJBR No.) 68404 (RB); Raxo da Catarina, Labouriou 912 (F, RB,US). MINAS GERAIS: 4 km N of Vasante de San Francisco, Municip. Januarica, 29 Sept. 1953, Magalhães 6082 (IAN,RB).

Vernacular Names: "Brinquinho" (Oliveira 68404).

Discussion: This species and *B. decipiens* form a small subgeneric grouping that may represent a separate phylogenetic offshoot of the genus. Both have several pairs of emarginate leaflets and small fruits, and both apparently are shrubs to small scrubby trees in the arid parts of southeastern Brazil. The smaller, glabrous or glabrescent leaflets, longer inflorescence, strongly revolute calyx segments, and larger number of stamens amply separate *B. mollis* from its closest relative.

7. *Bocoa decipiens* Cowan, sp. nov.

Swartzia decipiens Holmes, Pharm. Journ., ser. 4, 3:2. 4 July 1896.
(Provisional Name)

Diagnosis: Frutex foliorum foliolis basalibus rotundatis 3–9 mm longis, 5–5.5 mm latis; gynoecium sicut fructus strigulosum.

Description: Shrub with the branchlets minutely strigulose, the stipules minute; petioles 1–2 mm long, lightly canaliculate on upper surface, minutely strigulose, the rachis 9–28 mm long, minutely strigulose, obviously canaliculate-marginate on the upper surface; leaflets 5–7, imparipinnate, the laterals subopposite, the petiolules 0.2–0.5 mm, glabrous, the blades glabrous, smaller and rounded near the base of the leaves but progressively larger and more elliptic toward the leaf apex, the basal ones 3–9 mm long, 5–5.5 mm wide, the upper ones and the terminal one 14–22 mm long, 6–10 mm wide, the base acute except the basal ones rounded-obtuse, the apex rounded, emarginate, glabrous or sparingly puberulous minutely on the costa, the venation subobscure, the costa salient on both surfaces; inflorescences axillary, racemose, few-flowered, the axis 2–5 mm long, strigulose, the bracts persistent, ca. 0.5 mm long, the fruiting pedicels 8–10 mm long, glabrous; calyx segments 3 or 4, glabrous, separating to the base, about 4.5 mm long, reflexed; stamens 8–10, glabrous, the filaments 2.5–3 mm long; gynoecium densely strigulose; fruit more or less strigulose, the basal 1–2 mm of the style persistent as a beak, the body of the fruit 8–9 mm long and wide, broadly oval in outline, the surface more or less reticulate, gynophore and carpophore densely strigulose, 0.5–1 mm long; seed black, exarillate, oval in outline, 5 mm long, 3.5–4 mm wide.

Type-Collection: A. Lima & M. Magalhães 52-1075 (holotype US,

sheet no. 2639739, isotype IPA), "Nos campos da Serra Araripe, prox. Est. Exp. Araripina," Pernambuco, Brazil, 24 June 1952.

Distribution: Known certainly only from the type collection but circumstantial evidence in the following discussion indicates a broader range.

Discussion: In the latter part of the 19th Century, Europe was importing for medicinal purposes large quantities of one species of *Pilocarpus* (Rutaceae). As demand exceeded supply, another species of the same genus gradually came into commerce, as well as other unrelated adulterant plants. In his discussion of one of these, E. M. Holmes, who for 50 years was Curator of the Materia Medica Museum of the Pharmaceutical Society in London, noted in the paper referred to above, "Some of the more recent importations of these leaves (*Pilocarpus microphyllus*) have contained a few bales of leaves almost indistinguishable from them to the eye of the casual observer, . . . attention has probably been directed to them by their not yielding pilocarpine." He was encouraged by W. B. Hemsley at Kew to look among the legumes for the identity of the plant parts in the "few bales" and it is very much to Holmes's credit that he correctly related his scraps to *Swartzia*, three species in particular—*S. mollis*, *S. pilulifera*, and *S. matthewsii*. He concluded that his material "probably" represented an undescribed species which he characterized quite adequately, considering the quality of his material. However, the last sentence leaves considerable doubt with respect to the validity of the publication of the new species: "Until further specimens are procurable from which it might be determined if only one petal and five stamens are present, the plant might be provisionally named *Swartzia decipiens*." Article 34 of the Code states (in part), "A name is not validly published . . . (2) when it is merely proposed in anticipation of the future acceptance of the group concerned . . ." Having concluded that Holmes's description is invalid, I have supplied a Latin diagnosis and as full an English description as possible to make the same specific epithet available in *Bocoa* where the species properly belongs. Its very small leaflets and pubescent fruits serve to distinguish it readily from all the other species in the genus.

The choice of type collection indicated above requires some explanation, for ordinarily I would probably have used the older material on which Holmes had based his description. However, this was not practical in this instance. I have seen no material certainly studied by Holmes and used by him in drawing up his description, although there are two sheets at Kew which have been viewed as "type material." One is a small packet with a label bearing the following notation: "*Swartzia decipiens* Holmes / fruits picked out of the leaves in commerce. March 1897 / Comm E. M. Holmes / See Ph. Journ. July 4.96. p. 2." If one were to accept his description as validly published, this fragment would have to be viewed as the type. In addition, there is at Kew a "type" sheet bearing several small packets

and a note "with 2 samples (A & B) of 'genuine Paraguay Jaborandi leaves' / comm. by J. W. Drysdale & Co. / recd. 21.3.01." On the note there are sketches in pencil of calyx segments, a gynoeceum, a flower with pedicel, calyx segments, and ten antherless filaments (the anthers, petal, and gynoeceum are omitted from the flower sketch); there is also a representation of a partly opened ovary with ten ovules. The Berlin Herbarium likewise had one or more sheets of fragments obtained from the same source, the drug importing firms of Western Europe; copies of the photograph made by Macbride of the Berlin sheet are in several world herbaria but only the one at the Field Museum has a packet of the fragments from the original source. All these materials I have seen certainly represent the new species.

The small leaflets, fewer stamens, and smaller strigulose fruits serve to separate this poorly known taxon from *B. mollis*, with which it shares numerous characteristics. In fact, one can speculate, apparently rather safely, that *B. decipiens* is an evolutionary derivative of *B. mollis*.

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LIST OF EXSICCATAE

The figures in parentheses refer to the number assigned to each taxon.

| | |
|------------------------------|---------------------------|
| Allemão & Cysneiros | Bena, P. |
| 497 (6) | 1117 (5) |
| Aublet, K. B. C. F. | Black, G. A. & Ledoux, P. |
| s.n. (5) | 50-10669 (3) |
| BAFOG | Blanchet, J. S. |
| 339M (5); 7236 (5); 7249 (5) | 2774 (6) |

- Coelho, D.
3740 (1)
- Cowan, R. S.
38157 (1)
- van Donselaar, J.
2273 (5)
- Dias da Rocha
11183 (6)
- Dionisio
3076 (1)
- Duarte, A. P.
6978 (1)
- Ducke, A.
296 (1); 371 (1); 454 (1);
1923 (4); 1980 (6); 2116 (1);
2467 (6); 2582 (6); 7870 (3);
8865 (3); 11184 (3); 11185 (3);
11186 (3); 15856 (3); 16755
(3); 23342 (1); 24203 (1);
24219 (4)
- Francisco & Luis
4188 (1)
- French Guiana Forestry Depart-
ment
7126 (5); 7415 (5)
- Froes, R. L.
20465 (1); 24946 (1)
- Froes, R. L. & Addison
29016 (1)
- Glaziou, A. F. M.
9767 (1)
- Gonggrijp, J. W.
4175 (5)
- Guppy, N. G. L.
304 (4)
- Jiménez-Saa, H.
1568 (4)
- Killip, E. P. & Smith, A. C.
26502 (1)
- Krukoff, B. A.
7944 (1)
- Kuhlmann, J. G.
96 (1); 1607 (1)
- Labouriau, L.
912 (6)
- Lanjouw, J. & Lindeman, J. C.
2545 (5)
- Lima, A.
49-369 (2); 50-700 (6); 52-
1007 (2); 60-3443 (6); 60-3505
(6); 65-4270 (2)
- Lima, A. & Magalhães, M.
52-1050 (6); 52-1075 (7)
- Luis
13979 (1)
- Magalhães, M.
6082 (6)
- Melo, F. & Coelho, L.
4188 (1)
- Oliveira, A. B.
68404 (6)
- Oliviera, E.
2742 (1)
- Oldeman, R. A. A.
B-1614 (5); 2625 (5)
- Pires, J. M.
213 (1)
- Pires, J. M. & Black, G. A.
930 (1)
- Prance, G. T. et al.
3137 (1)
- Riedel, L.
1 (1); s.n. (1)
- Rodrigues, W. et al.
1877 (1); 4112 (1); 4473 (1);
4723 (1); 4811 (1)
- Sagot, P.A.
1210 (5)
- Schwacke, C. A.
3942 (1)
- Schomburgk, Rich.
585 (1)
- Schomburgk, Robt.
293 (1)
- Schulz, J. P.
7926 (5)
- Silva, N.T.
3024 (4)
- Smith, A. C.
2772 (1); 2828 (1); 2991 (1);
2996 (1); 3147 (1); 3575 (1)
- Snethlage
10058 (3)

128 *Proceedings of the Biological Society of Washington*

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| Soares, J. | 4455 (5); 4477 (5); 4521 (5); |
| 2185 (2) | 4569 (5); 4781 (5); 5441 (1); |
| Spruce, R. | 5556 (5); 5769 (5); 5839 (5); |
| 1106 (1); s.n. (1) | 6084 (5); 6130 (5) |
| Stahel, G. | Suriname Woodherbarium |
| 69 (5) | 69 (5) |
| Suriname Forestry Department | Tawjoeran, J. |
| 342 (5); 1191 (5); 1198 (5); | 12581 (5) |
| 1434 (5); 1560 (5) 1660 (5); | Wachenheim |
| 2552 (5); 2743 (5); 3984 (5); | s.n. (5) |
| 3986 (5); 4185 (5); 4326 (5); | Wilson-Browne, G. |
| | 176 (1) |